

REMARKS

In the patent application, claims 1-7, 9-17, 19-34 and 36 are pending. In the final office action, all pending claims are rejected.

Applicant has amended claims 1-7, 9-17, 19-34 and 36.

Claims 1, 11, 21 and 26 have been amended to include the limitation that the one parameter comprises a shift amount in time indicative of a difference between a sampling time and a transmission of a packet at the server.

The support for the amendment can be found in claims 2 and 3.

Claims 2, 12, 22 and 29 have been amended to include the limitation that the shift amount is substantially equal to the difference.

The support for the amendment can be found in the original claim 2.

Claims 3, 13, 23 and 30 have been amended to include the limitation that the shift amount is greater than the difference.

The support for the amendment can be found in the original claim 3.

Claims 6, 10, 16, 25 and 32 have been amended to include the limitation that the parameter comprises a shift amount indicative of a clock drift between the server and the client.

The support for the amendment can be found on page 13, line 33 to page 14, line 4 of the specification.

Claims 4, 5, 7, 9, 14, 15, 17, 19, 20, 24, 27, 28, 31, 33, 34 and 36 have been amended to change the wording of the claims.

No new matter has been introduced.

At section 2 of the office action, claims 1-7, 9-17 and 19-34 and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by *Ravi et al.* (U.S. Patent No. 6,292,834, hereafter referred to as *Ravi*).

The Examiner states that *Ravi* teaches a method for multimedia streaming as claimed in claim 1.

It is respectfully submitted that claim 1 includes the limitations of

- 1) defining in a client in a multimedia streaming network at least one parameter for determining a rate adaptation operating range, wherein the streaming network comprises a server configured for providing streaming data to the client, the client having a receiver buffer for storing at least part of the streaming data to compensate for a difference between data transmission amount by the server and usage amount of the streaming data by the client so as to allow the client to have sufficient amount of streaming data to play out in a non-disruptive manner, and wherein the rate adaption operating range is used for rate adaptation between the server and the client;
- 2) providing to the server information indicative of said at least one parameter;
- 3) adapting in the server the data amount to a reception rate at the client based on said at least one parameter, and
- 4) adjusting in the client packet transfer delay variation based on said adapting, wherein the one parameter comprises a shift amount in time indicative of a difference between a sampling time and a transmission time of a packet at the server.

In rejecting claim 1, the Examiner points to column 6, lines 33-47; column 7, lines 16-25 and column 8, lines 26-45 to show that *Ravi* discloses adapting in the server the data amount to a reception rate at the client based on said at least one parameter.

In rejecting claims 2 and 3, the Examiner further states that *Ravi* discloses a minimum shift amount (decrease bandwidth threshold 512, column 7, lines 35-45) and a target shift amount (delta playtime and shift amount, column 8, lines 36-65).

Applicant respectfully disagrees.

At column 6, lines 32 to 47, *Ravi* discloses:

The present invention is directed at the efficient and reliable streaming of data packets from stream server 220 to client computer 240, accomplished by optimally utilizing the bandwidth of the connection provided by computer network 290 while minimizing the loss

of packets. In one embodiment, the transmission rate of the data stream is dynamically adjusted in response to changes in the bandwidth made available by computer network 290 for the network connection between server 220 and client computer 240.

Accordingly, server 220, in response to feedback from client computer 240, dynamically selects transmission rates in order to better match the varying bandwidth capacity of the network connection. For example, server 220 streams video packets at 1 frames/second (fps), 5 fps, 10 fps, and 15 fps for bandwidths of 4 kbits/second (kbps), 14 kbps, 18 kbps, and 44 kbps.

In the above paragraph, *Ravi* only discloses that the transmission rate of the data stream is adjusted in response to the changes in the bandwidth made available of the computer network between the server and the client. For example, the streaming can be carried out at 1, 5, 10 and 15 fps for bandwidths of 4, 14, 18 and 14 kps.

At column 7, lines 16 to 25, *Ravi* discloses:

FIGS. 5A, 5B, 5C, 5D and 5E, are detailed flowcharts illustrating steps 410, 420, 430, 440 and 450, respectively, of FIG. 4. In step 410, the performance variables are computed. Next, in step 420, the computed performance variables are used to determine if it is desirable to decrease the bandwidth, and if so, then in step 430, the bandwidth is decreased. If a bandwidth decrease is not desirable, then in step 440, the performance variables are used to determine if it is desirable to increase the bandwidth. If a bandwidth increase is desirable, then in step 450, the bandwidth is increased.

In the above paragraph, *Ravi* discloses the client computer 240 computes the performance variable (step 410), including computing playtime and delta_playtime (step 513); decreasing the bandwidth (step 430) and sending a reduce_bandwidth message to the server (step 537); or increasing the bandwidth (step 450) and sending an increase_bandwidth message to the server (step 522). According to *Ravi*, the term “bandwidth” is synonymous to the “transmission rate” (column 6, line 63 to column 7, line 5).

At column 7, lines 35-45, Ravi discloses:

FIGS. 6A and 6B are two halves of a flowchart illustrating the dynamic determination of the Upper INC_BW threshold and the DEC_BW threshold, step 512 in greater detail. In step 612, the difference (D1) between the Current_Time and the previous time the dynamic bandwidth selection method was invoked is computed. In step 614, the difference (D2) between the timestamp of the last data packet currently in playout buffer 366 and the timestamp of the last data packet in playout buffer 366 during the previous invocation of the Adjust_Bandwidth procedure, is computed. In step 616, the difference (D3) between the number of bytes received by the previous invocation and the number of bytes currently received (by the current invocation) is computed.

At column 8, lines 26 to 65, Ravi discloses:

FIG. 7A is a flowchart illustrating the computation of variables Playtime and Delta_Playtime, step 513, in greater detail. In step 710, Playtime is set to the Duetime of the last packet in playout buffer 366. The computation of the Duetime is described in greater detail in step 740 below. Client computer 240 determines the change in the Playout_Buffer_Size (step 720). The Delta_Playtime is set to the difference between the current Playtime and the Playtime at the previous invocation of the Adjust_Bandwidth procedure (step 730). Variables Playtime and Delta Playtime provide exemplary absolute and relative measures, respectively, of the Playout_Buffer_Size, the number of data packet(s) in playout buffer 366.

FIG. 7B illustrate the determination of the Duetime of a data packet (step 710). First, the Base_TS is set to the timestamp of the first packet received by client computer 240 (step 712). The Base_Time is set to the time when the first packet was received (step 716). The TS is set the timestamp of the data packet of interest (step 746).

In the above paragraphs, Ravi only discloses how the client computer 240 computes the Playtime and Delta Playtime (step 513, Figures 5a and 7a)

At column 8, lines 50-64, *Ravi* discloses:

As shown in FIG. 8, in step 514, client computer 240 determines if Round_Trip_Time_Bit should or should not be set to High. The boolean equation 810 used for the determination is:

*(Round_Trip_Time > C18) & (Round_Trip_Time has increased over the last C19 samples)
& (New sampling of Round_Trip_Time occurred since the previous Reduce_Bandwidth message was sent to the server because the Round_Trip_Time_Bit was set to High)
Wherein C18 is 4 seconds, and C19 is 3 samples.*

In step 516 of FIG. 9, a determination of whether Lossrate_Bit should be set to High.

In the above paragraphs, *Ravi* discloses the new **sampling of round-trip time** (column 8, line 58). *Ravi* does not disclose a sampling time of a packet at the server. *Ravi* does not disclose a difference between the sampling time and the transmission time of a packet at the server.

Furthermore, decrease bandwidth threshold, as disclosed in *Ravi*, is set such that when the playtime or the number of data packets currently in the playout buffer drops below that threshold. When that happens, the client sends a DEC_BW message to the server for decreasing the transmission rate (col. 3, lines 15-19). *Ravi* discloses sending the DEC_BW message based on the relationship between the playtime and the number of data packets in the playout buffer at the client. *Ravi* does not disclose sending a parameter comprising the shift amount in time which is equal to the difference between the sampling time and the transmission time of a packet.

The delta playtime, as disclosed in *Ravi*, is equal to the difference between the current playtime and the playtime at the previous invocation of Adjust_Bandwidth Procedure (step 730). Delta_Playtime provide an exemplary relative measure of the Playout_Buffer Size and the number of data packets in the playout buffer 366 (col.8, lines 32-38). Thus, Delta_Playtime is a measure of the size and the number of data packets in the client playout buffer. *Ravi* does not disclose sending a parameter indicative of a shift amount greater than the difference between the sampling time and the transmission time of a packet.

On page 6 of the office action, first paragraph, the Examiner also states that *Ravi* teaches that the server, in response to the feedback from the client computer 240, dynamically selects transmission rates (streaming rates) in order to better match the varying bandwidth capacity of the network connection. However, *Ravi* does not disclose that the transmission rate is adjusted based on the parameter sent by the client, wherein the parameter comprises a shift amount in time indicative of a difference between the sampling time and the transmission time of a packet.

For the above reasons, *Ravi* fails to anticipate independent claim 1.

For the same reasons, *Ravi* also fails to anticipate independent claims 11, 21 and 26.

In rejecting claim 6, the Examiner states that *Ravi* discloses that the parameter comprises a clock shift amount (column 10, lines 20-32).

At column 10, lines 20-32, *Ravi* discloses:

Referring now to FIG. 5D, if a bandwidth decrease is not desirable (420n), then in step 440, the performance variables are used to determine if it is desirable to increase the bandwidth. In this conservative approach, if the Payout_Buffer_Size exceeds the Upper INC_BW threshold and continues to stay above the Lower INC_BW threshold for the INC_BW wait period, then the bandwidth is increased. In other words, the bandwidth is increased only when there is a fairly high probability that the next higher bandwidth will be sustainable by computer network 290. Hence, the Lower_INC_BW threshold requirement reduces the probability of the selected bandwidth oscillating rapidly between two bandwidth points and possibly causing jitter.

In the above paragraph, *Ravi* only discloses how to reduce the probability of the selected bandwidth oscillating rapidly between two bandwidth points by using a certain increase_bandwidth threshold. *Ravi* does not disclose that the client sends a parameter comprising a shift amount in time indicative of a clock drift between the server and the client.

For the above reasons, *Ravi* fails to anticipate independent claim 6.

For the same reasons, *Ravi* fails to anticipate independent claim 32 and dependent claims 16 and 25.

As for claims 2-5, 7, 9, 10, 12-15, 17, 19, 20, 22-24, 27-31, 33, 34 and 36, they are dependent from claims 1, 11, 21, 26 and 32 and recite features not recited in claims 1, 11, 21, 26 and 32. For reasons regarding claims 1, 11, 21, 26 and 32 above, *Ravi* also fails to anticipate claims 2-5, 7, 9, 10, 12-15, 17, 19, 20, 22-24, 27-31, 33, 34 and 36.

CONCLUSION

Claims 1-7, 9-17, 19-34 and 36 are allowable. Early allowance of all pending claims is earnestly solicited.

Respectfully submitted,



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